SAFETY DATA SHEET

ISOBUTANE Version 1.0 Issued Date: 2018-04-28

SECTION 1. Identification

Product Name	REFRIGERANT R600a, Isobutane
UN/ID do.	UN1969
Synonyms	Methylpropane; IC4

Relevant identified uses of the substance or mixture and uses advised against product use

Recommended use	Industrial and professional use
Manufacturer	PUYANG CITY HAIHONG HUAYI CHEMICALS CO., LTD. Add: Wendong Industrial Zone, Wenliu Town, Puyang City, Henan Phone: 0086-574-63816499
Emergency Phone Number	0086-574-63816499（24h）

SECTION 2. Hazards Identification

Classification of the chemical in accordance with CFR 1910.1200(d)(f)
This product has been classified in accordance with the hazard communication standard 29 CFR 1910.1200; the SDS and labels contain all the information as required by the standard.

GHS Pictograms

Signal Word: Danger

Hazard Statements:
Extremely flammable gas.
Contains gas under pressure; may explode if heated.
May displace oxygen and cause rapid suffocation.
H224: Extremely flammable liquid and vapor.
H280: Contains gas under pressure; may explode if heated.

Other hazards: May displace oxygen and cause rapid suffocation.

Precautionary Statements

Prevention:
P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P233 Keep container tightly closed.
P240 Ground/bond container and receiving equipment. P241Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242 Use only non-sparking tools.
P243 Take precautionary measures against static discharge. P280Wear protective gloves/ eye protection/ face protection.

Response:
P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P370 + P378In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:
P410 + P403Protect from sunlight. Store in a well-ventilated place.

Disposal:
P501Dispose of contents/ container to an approved waste disposal plant.

Carcinogenicity

IARC	No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
NTP	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

SECTION 3. Composition/information on ingredients

Molecular formula C_4H_{10}

Components	CAS No.	Weight,%	Remark
Isobutane	75-28-5	99.0~99.9	
n-butane	106-97-8	0.1-1.0	
Propane	74-98-6	0.1-1.0	

All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

SECTION 4. First aid measures

General advices

Move out of dangerous area. Show this material safety data sheet to the doctor in attendance.

If inhaled

Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

In case of skin contact

Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Get medical attention if symptoms occur. In case of contact with liquid, warm frozen tissues slowly with lukewarm water and get medical attention. Do not rub affected area. Wash clothing before reuse.
Clean shoes thoroughly before reuse.

If Ingestion

Remove victim to fresh air and keep at rest in a position comfortable for breathing. Get medical attention if adverse health effects persist or are severe. Ingestion of liquid can cause burns similar to frostbite. If frostbite occurs, get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. As this product rapidly becomes a gas when released, refer to the inhalation section.

In case of eye contact

Flush eyes with water as a precaution. Remove contact lenses. Protect unharmed eye. Keep eye wide open while rinsing. If eye irritation persists, consult a specialist.

If swallowed

Keep respiratory tract clear. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.

Notes to Physician

Epinephrine and sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

SECTION 5. Firefighting measures

Flash point	-82℃(-116℉)
Autoignition temperature	460℃(860℉)
Suitable extinguishing media	Alcohol-resistant foam. Carbon dioxide (CO_2). Dry chemical. Use caution when applying carbon dioxide in confined spaces.
Unsuitable extinguishing media	High volume water jet.
Specific hazards during fire fighting	Do not allow run-off from fire fighting to enter drains or water courses.
Special protective equipment for fire-fighters	Wear self-contained breathing apparatus for firefighting if necessary.
Further information	Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations. For safety reasons in case of fire, cans should be stored separately in closed containments. Use a water spray to cool fully closed containers.
Fire and explosion protection	Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.
Hazardous decomposition products	No data available.

SECTION 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Extremely flammable. Release of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Beware of accumulation of gas in low areas or contained areas, where explosive concentrations may occur. Prevent from entering drains or any place where accumulation may occur. Ventilate area and allow to evaporate. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down-wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards, handling and storage.
Environmental precautions	Prevent product from entering drains. Prevent further leakage or spillage if safe to do so. If the product contaminates rivers and lakes or drains inform respective authorities.
Methods for cleaning up	Contain spillage, and then collect with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and place in container for disposal according to local / national regulations Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Keep combustibles (wood, paper, oil, etc.) away from spilled material. Stop leak if you can do so without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Isolate area until gas has dispersed. For waste disposal, see section 13 of the SDS.

SECTION 7. Handling and storage

Handling

Advice on safe handling	Avoid formation of aerosol. For personal protection see section 8. Smoking,

eating and drinking should be prohibited in the application area. Take precautionary measures against static discharges. Provide sufficient air exchange and/or exhaust in work rooms. Open drum carefully as content may be under pressure. Dispose of rinse water in accordance with local and national regulations.

Advice on protection against fire and explosion

Do not spray on an open flame or any other incandescent material. Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors). Use only explosion-proof equipment. Keep away from open flames, hot surfaces and sources of ignition.

Storage

Requirements for storage areas and containers

No smoking. Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.
Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post in area “No Smoking or Open Flame.” Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.
“Empty” containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death.

SECTION 8. Exposure controls/ personal protection

Ingredients with workplace control parameters

Ingredients	Basis	Value	Control parameter	Note
Isobutane	ACGIH	STEL	1000mg/kg	---
Propane	OSHA	PEL	1800mg/m^3 1000mg/kg	---
Butane	ACGIH	STEL	1000mg/kg	---
Butane	NIOSH	TWA	1900mg/m^3 800mg/kg	---
Isobutane	NIOSH	TWA	1900mg/m^3 800mg/kg	---
Propane	NIOSH	TWA	1800mg/m^3 1000mg/kg	---

(b) The value in mg/m3 is approximate.
CNS impair Central Nervous System impairment
EX Explosion hazard: the substance is a flammable asphyxiant or excursions above the TLV ® could approach 10% of the lower explosive limit.

Biological limit values

No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls

Explosion proof exhaust ventilation should be used. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable

	level. Provide adequate ventilation and minimize the risk of inhalation of gas.
Immediately Dangerous to Life or Health Concentrations (IDLH)	No data available
Engineering measures	Adequate ventilation to control airborned concentrations below the exposure guidelines/limits. Consider the potential hazards of this material (see Section 2), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.
Personal protective equipment	
Respiratory protection	Wear a supplied-air NIOSH approved respirator unless ventilation or other engineering controls are adequate to maintain minimal oxygen content of 19.5% by volume under normal atmospheric pressure. Wear a NIOSH approved respirator that provides protection when working with this material if exposure to harmful levels of airborne material may occur, such as:. Air-Purifying Respirator for Organic Vapors. Use a positive pressure, air-supplying respirator if there is potential for uncontrolled release, exposure levels are not known, or other circumstances where air-purifying respirators may not provide adequate protection.
Hand protection	The suitability for a specific workplace should be discussed with the producers of the protective gloves. Please observe the instructions regarding permeability and breakthrough time which are provided by the supplier of the gloves. Also take into consideration the specific local conditions under which the product is used, such as the danger of cuts, abrasion, and the contact time. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.
Eye protection	Eye wash bottle with pure water. Tightly fitting safety goggles.
Skin and body protection	Choose body protection in relation to its type, to the concentration and amount of dangerous substances, and to the specific work-place. Wear as appropriate. Flame retardant antistatic protective clothing. Workers should wear antistatic footwear.
Hygiene measures	When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

SECTION 9. Physical and chemical properties

Information on basic physical and chemical properties

Appearance	
Form	Liquefied gas
Physical state	Liquid
Color	Colorless
Color	colorless
Safety data	
Flash point	-82℃(-116℉)

Low explosion limit	2.0%(w/w)
Upper explosion limit	8.8%(w/w)
Autoignition temperature	460℉ (860℉)
Thermal decomposition	No data available
Molecular points/range	No data available
Molecular weight	58.14g/mol
Melting point/range	No data available
Boiling point/boiling range	-160 °C (-256 °F)
Boiling point/boiling range	-12 °C (10 °F)
Vapor pressure	70.00 - 75.00 PSI at 38 °C (100 °F) Method: Reid
Relative density	0.56 at 16 °C (60 °F)[3]
Density	0.552 g/cm^3 at 25 °C (77 °F)
Solubility	Insoluble in the following materials: cold water and hot water.

SECTION 10. Stability and reactivity

Chemical stability	This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Possibility of hazardous reactions	
Conditions to avoid	Heat, flames and sparks.
Thermal decomposition	No data available
Hazardous decomposition products	No data available
Hazardous Polymerization	No data available
Other data	No decomposition if stored and applied as directed.

SECTION 11 Toxicological information

Isobutane	
Acute oral toxicity	LD50: > 5,000 mg/kg Method: Estimated based on individual component values.
Isobutane	
Acute inhalation toxicity	LC50: > 31 mg/l Exposure time: 4 h Species: Rat Test atmosphere: vapor
Isobutane	
Acute inhalation toxicity	LC50: > 31 mg/l Exposure time: 4 h Species: Rat Test atmosphere: vapor
Isobutane Acute dermal toxicity	LD50: > 5,000 mg/kg Method: Estimated based on individual component values.
Isobutane Skin irritation	Rapid evaporation of the liquid may cause frostbite.

Eye irritation	No eye irritation.
Isobutane Sensitization	No adverse effects expected.
Isobutane Repeated dose toxicity	Method: Not expected to be carcinogenic based on individual component data.
Isobutane Carcinogenicity	Method: Not expected to be carcinogenic based on individual component data.
Toxicology Assessment	
Isobutane CMR effects	Carcinogenicity: Not classifiable as a human carcinogen. Mutagenicity: This information is not available. Teratogenicity: Embryotoxicity classification not possible from current data. Reproductive toxicity: Fertility classification not possible from current data.
Isobutane Further information	Solvents may degrease the skin.

SECTION 12. Ecological information

	Elimination information (persistence and degradability)
Bioaccumulation	
Propane	No data available
Biodegradability	This material is expected to be readily biodegradable.
Ecotoxicology Assessment	No data available
Acute aquatic toxicity	Harmful to aquatic life.
Mobility in Soil	Due to the extreme volatility of petroleum gases, air is the only environmental compartment in which they will be found. In air, these hydrocarbons undergo photodegradation by reaction with hydroxyl radical with half-lives ranging from 3.2 days for n-butane to 7 days for propane.
Results of PBT assessment	No data available
Additional ecological information	
Isooctane	Isobutane

SECTION 13. Disposal considerations

Product	The information in this SDS pertains only to the product as shipped. Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility. Do not dispose of waste into sewer. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company.
Contaminated packaging	Empty remaining contents. Dispose of as unused product. Do not re-use empty containers. Do not burn, or use a cutting torch on, the empty drum.

SECTION 14. Transport information

The shipping descriptions shown here are for bulk shipments only, and may not apply to shipments in non-bulk packages (see regulatory definition).

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

Consult the appropriate domestic or international mode-specific and quantity-specific Dangerous Goods Regulations for additional shipping description requirements (e.g., technical name or names, etc.) Therefore, the information shown here, may not always agree with the bill of lading shipping description for the material. Flashpoints for the material may vary slightly between the SDS and the bill of lading.

US DOT (UNITED STATES DEPARTMENT OF TRANSPORTATION)	UN1969, ISOBUTANE, 2.1 NON- ODORIZED
IMO / IMDG (INTERNATIONAL MARITIME DANGEROUS GOODS)	UN1969, ISOBUTANE, 2.1, (-82 °C) NON- ODORIZED
IATA (INTERNATIONAL AIR TRANSPORT ASSOCIATION)	N1969, ISOBUTANE, 2.1 NON- ODORIZED
ADR (AGREEMENT ON DANGEROUS GOODS BY ROAD (EUROPE))	UN1969, ISOBUTANE, 2.1, (B/D) NON- ODORIZED
RID (REGULATIONS CONCERNING THE INTERNATIONAL TRANSPORT OF DANGEROUS GOODS (EUROPE))	UN1969, ISOBUTANE, 2.1 (13) NON- ODORIZED
ADN (EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY INLAND WATERWAYS)	UN1969, ISOBUTANE, 2.1 NON- ODORIZED

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

SECTION 15. Regulatory information

National legislation

SARA 311/312 Hazards	Flammable (gases, aerosols, liquids, or solids) Gases under pressure
CERCLA Reportable Quantity	Calculated RQ exceeds reasonably attainable upper limit.
SARA 302 Reportable Quantity	This material does not contain any components with a SARA 302 RQ.
SARA 302 Threshold Planning Quantity	No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

SARA 304 Reportable Quantity	This material does not contain any components with a section 304 EHS RQ.
SARA 313 Ingredients	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.
Clean Air Act	
Ozone-Depletion Potential	This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B). The following chemical(s) are listed under the U.S. Clean Air Act Section 112(r) for Accidental Release Prevention (40 CFR 68.130, Subpart F): Isobutane - 75-28-5
US State Regulations	
Pennsylvania Right To Know	Isobutane - 75-28-5
California Prop. 65 Ingredients	WARNING! This product contains a chemical known in the State of California to cause cancer.
Notification status	
Europe REACH	Not in compliance with the inventory
United States of America (USA)	On the inventory, or in compliance with the inventory
Canada DSL	On the inventory, or in compliance with the inventory
Australia AICS	On the inventory, or in compliance with the inventory
New Zealand NZIoC	On the inventory, or in compliance with the inventory
Japan ENCS	On the inventory, or in compliance with the inventory
Korea KECI	On the inventory, or in compliance with the inventory
Philippines PICCS	On the inventory, or in compliance with the inventory
China IECSC	On the inventory, or in compliance with the inventory

SECTION 16. Other information

NFPA Classification	Health Hazard: 1 Fire Hazard: 4 Reactivity Hazard: 0 
Further information	The information in this SDS pertains only to the product as shipped. The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text. Key or legend to abbreviations and acronyms used in the safety data sheet

ACGIH	American Conference of Government Industrial Hygienists	LD50	Lethal Dose 50%

AICS	Australia, Inventory of Chemical Substances	LOAEL	Lowest Observed Adverse Effect Level
DSL	Canada, Domestic Substances List	NFPA	National Fire Protection Agency
EGEST	EOSCA Generic Exposure Scenario Tool	OSHA	Occupational Safety & Health Administration
EOSCA	European Oilfield Specialty Chemicals Association	PEL	Permissible Exposure Limit
EINECS	European Inventory of Existing Chemical Substances	PICCS	Philippines Inventory of Commercial Chemical Substances
MAK	Germany Maximum Concentration Values	PRNT	Presumed Not Toxic
GHS	Globally Harmonized System	RCRA	Resource Conservation Recovery Act
>=	Greater Than or Equal To	STEL	Short-term Exposure Limit
IC50	Inhibition Concentration 50%	SARA	Superfund Amendments and Reauthorization Act.
IARC	International Agency for Research on Cancer	TLV	Threshold Limit Value
IECSC	Inventory of Existing Chemical Substances in China	TWA	Time Weighted Average
ENCS	Japan, Inventory of Existing and New Chemical Substances	TSCA	Toxic Substance Control Act
KECI	Korea, Existing Chemical Inventory	UVCB	Unknown or Variable Composition, Complex Reaction Products, and Biological Materials

<=	Less Than or Equal To	WHMIS	Workplace Hazardous Materials Information System
LC50	Lethal Concentration 50%		

Disclaimer of Expressed and Implied Warranties:
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RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT,
OR THE HAZARDS RELATED TO ITS USE.

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